via regulations.gov
U.S. Environmental Protection Agency (EPA)
EPA Docket Center-OAR (MC-28221T)
1200 Pennsylvania Avenue NW,
Washington, DC 20460

RE: *Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine (HDE) Standards*; 40 CFR Parts 2, 59-60, 80, 85-87, 600, 1027, 1030, 1033, 1036-37, 1039, 1042-43, 1045, 1048, 1051, 1054, 1060, 1065-66, 1068, and 1090; Doc No. EPA–HQ–OAR–2019–0055.

Ladies and Gentlemen:

The American Truck Dealers (ATD) represents over 1,800 franchised commercial motor vehicle (CMV) dealers nationwide who sell new and used medium- and heavy-duty CMVs and who engage in service, repair, and parts sales. Together they employ more than 125,000 people nationwide, but most are small businesses as defined by the Small Business Administration.

In March 2022, EPA published a proposal to implement the Cleaner Trucks Initiative (CTI) first announced in November 2018.[1] In December 2016, EPA granted a rulemaking petition filed by several states and others that resulted in the CTI. Among other things, the CTI aims to update current 2010 heavy-duty on-road engine (HDE) oxides of nitrogen (NOx) emission standards, to increase the stringency of the existing Phase 3 greenhouse gas (GHG) mandates, to streamline certain HDE emissions testing and certification procedures, and to establish strategies to enhance long-term in-use emissions performance. The following comments and suggestions focus on the potential impacts of EPA's proposal on CMV sales and fleet turnover.[2]

I. Background

ATD has long supported continuous emission improvements for HDEs. At the same time, ATD has suggested consistently that any new emissions mandates must not compromise the affordability, reliability, fuel economy, and/or serviceability of HDEs and CMVs. This position reflects the fact that prospective customers will avoid purchasing or leasing new CMVs which cost too much, offer performance compromises, or pose risks of unacceptable downtime. CMV customers purchase or lease new equipment *only* when necessary to meet the needs of their private or for-profit business models and use cases. New medium- and heavy-duty CMVs are expensive, but unlike high-priced light-duty vehicles, they are not luxuries but specially built to do a wide variety of jobs in a reliable and cost-effective manner.

[1] 87 Fed. Reg. 17414, *et seq.* (March 28, 2022). In August 2021, the CTI was folded into a Clean Truck Plan which also aims to set new CMV greenhouse gas (GHG) standards for MYs 2030 and beyond.
[2] In February 2020, ATD commented on an advanced notice of proposed rulemaking on the CTI. 85 Fed. Reg. 3306, *et seq*. (January 21, 2020). ATD also signed on to a May 9, 2022, letter to Administrator Regan. *See Attachment A.*

Appropriately structured HDE NOx standards must involve a national, wholistic approach to reducing the impact of CMVs on air quality. Specifically, *EPA must only adopt new HDE emission standards that will enhance (and not delay) fleet turnover.* If EPA instead moves too far, too fast, as the California Air Resources Board (CARB) and other states have done, the cost of new CMVs will increase dramatically even as their performance degrades, resulting in a decline in the otherwise applicable rate of fleet turnover and environmental improvement.[3]

Prospective purchasers and lessors apply rigorous total cost of ownership (TCO) and return on investment (ROI) decision-making when considering investments in new CMVs. Consequently, CMVs equipped with HDEs subject to new NOx emission reduction mandates must be affordable to buy or lease, must be cost effective to operate, and must offer acceptable levels of reliability (i.e., uptime). The trucking industry learned this firsthand with HDEs subject to EPA's 2002-10 NOx standards. A study conducted in-house by ATD details the dramatic impact those standards had because they proved costly to comply with and degraded vehicle performance.[4] The study found that EPA underestimated control strategy and technology compliance costs by a *factor of 2-5,* resulting in dramatically higher prices for new CMVs. It also found that EPA's mandates resulted in significantly higher operating costs, due to increased maintenance requirements, reduced reliability, and lower fuel economy.

Together, the higher CMV prices and operating costs that directly stemmed from EPA's 2002-10 HDE NOx standards led to a significant disruption of the new CMV marketplace, leading to lost employment, lost profits, and even the shuttering of some businesses. New CMV customers acted rationally and predictably to avoid higher new CMV prices and performance compromises. Many opted to pre-buy new CMVs equipped with older HDEs. Others opted to hold onto their existing equipment for longer than they otherwise planned to. Still others met their business needs by seeking out late model used CMVs. Employees suffered, the industry suffered, and the environment suffered as fleet turnover ground to a halt.

This history must not be repeated. EPA must ensure that the new NOx mandates for MY 2027 and later will be technologically feasible and cost effective, both up front and over the useful life of the HDEs they will apply to. Otherwise, if faced with products that are too costly up front, too expensive to operate, or too unreliable, prospective new CMV buyers will once again opt to pre-buy CMVs equipped with older HDEs, opt to hold onto older CMVs longer, or opt for the used truck market. In addition to disrupting CMV suppliers, manufacturers, dealers, and the employees who work for them, the resulting delay in fleet turnover will undermine the continuous environmental improvements we all seek.

[3] In October 2021, several states urged EPA to adopt CARB's newly adopted HDE NOx Omnibus mandates. ATD categorically opposes EPA's adoption of those mandates.

[4] *See Attachment B,* Calpin and Plaza Jennings, *A Look Back at EPA's Cost and Other Impact Projections for My 2004-2010 Heavy-Duty Truck Emissions Standards* (2/13/12)

II. ATD's Overarching Positions on EPA's Proposal

1. **New NOx Standard.** Based on a review of information provided by HDE and CMV manufacturers (OEMS), ATD urges EPA to adopt proposed "Option 2," which will require dramatic but arguably feasible HDE NOx reductions starting with MY 2027. ATD strongly opposes proposed "Option 1" which would mandate an unacceptable two-step set of new standards in MY 2024 and MY 2031 that will not be feasible to comply with without significantly compromising expected vehicle performance characteristics, including fuel economy. ATD generally supports the comments filed by the Truck and Engine Manufacturers Association (EMA) with respect to both the NOx options laid out by EPA and the proposals related to HDE emissions testing and certification procedures and to long-term in-use emissions performance.

2. **New GHG Standards:** ATD categorically opposes increases to the stringency of the Phase 2 HDE/CMV fuel economy/GHG standards applicable through MY 2027 as they would undermine the regulatory certainty that is critical to compliance. The technology-forcing Phase 2 standards resulted from a carefully coordinated joint rulemaking with the National Highway Traffic Safety Administration (NHTSA), which is primarily responsible for administering the Energy Policy and Conservation Act (EPCA), as amended by the Energy Independence and Security Act (EISA).[5] Indeed, NADA suggests that it would be contrary to the intent of Congress for EPA to, on its own, revise the Phase 2 HDE/CMV fuel economy/GHG standards. Moreover, EPA's suggestion that the Phase 2 mandates should be tightened given potential HDE and CMV OEM ZEV product plans is an arbitrary and unjustified "no good deed goes unpunished" policy strategy.

In addition, while ATD does not oppose work by EPA on a new (Phase 3) fuel economy/GHG rulemaking for MYs 2030 and later, such rulemaking also must be conducted jointly with the NHTSA, consistent with the statutory authority spelled out in EPCA, as amended by EISA.

3. **Zero Emission CMVs:** Almost daily an HDE or CMV OEM announces a new alternative fuel or technology (natural gas, hydrogen fuel cell, battery-electric, etc) product they are developing. ATD's members are committed to educating prospective new CMV customers about these exciting new products, to selling, leasing, servicing, and repairing those products as they come to market, and to making the investments in on-site fueling, tooling, and education necessitated by those products. And as evidenced by activities at the March 2022 NADA/ATD Show[6], and by its work with the U.S. Departments of Transportation and Energy on the deployment of critical public charging facilities, ATD is likewise committed. But ATD urges EPA to recognize that, while alternative fueled and new technology vehicles are on coming, this NOx rulemaking should focus exclusively on feasible and cost-effective strategies for reducing NOx emissions from the significant number of new CMVs powered by ICE diesel and gasoline HDEs that also will be coming to market in MY 2027 and beyond.

[5] Section 102 of EISA specifically mandated that NHTSA coordinate with EPA to establish fuel economy/GHG standards for medium- and heavy-duty trucks. 49 U.S.C. §32902(b)(1)(C).
[6] *See Attachment C,* NADA, *Everything Electric at NADA/ATD Show 2022* (2022).

III. Achieving Cleaner Air and Healthier Communities Necessitates Replacing Older CMVs With Newer Cleaner/Greener Ones, Yet EPA's Flawed Analysis Places These Goals at Risk.

Based on industry cost analyses and data related to the marketplace reactions to EPA's MY 2002-2010 HDE NOx standards, ATD is concerned that EPA's proposed NOx standards, assuming that they are even achievable, will cause CMV prices to skyrocket, resulting in reduced fleet turnover and an increase in the average age of the on-road CMV fleet. The most effective near-term option for reducing CMV NOx emissions is to accelerate the turnover of the on-road CMV fleet. Currently, the average age of CMVs on the road in the U.S. is over 14 years.[7] Consequently, almost 50% of the in-use CMV fleet is equipped with pre-MY 2010 HDEs.

The current average cost of a new MY 2022 Class 8 CMV is $140,826.[8] ATD suggests that EPA has underestimated what the average cost of similar CMVs will be in MYs 2027-2030. Analyses conducted by Ricardo Strategic Consulting (RSC) found that the incremental costs for Option 1 will be $42,051,[9] which contrasts with EPA's prediction that incremental costs will be $16,750.

Given RSC's projected average CMV price increase, ATD concludes that EPA's proposed Option 1 NOx standards could have a major disruptive impact on new CMV sales resulting from a major pre-buy/no buy, a significant deferral of new CMV sales, and a spike in later model used CMV purchases prior to 2031. This conclusion runs counter to EPA's suggestion that a *pre- and low-buy for Class 8 trucks may range from zero to an approximately two percent increase in sales over a period of up to 8 months before the 2031 standards begin (pre-buy), and a decrease in sales from zero to approximately two percent over a period of up to 12 months after the 2031 standards begin (low-buy*).[10]

Importantly, the COVID-19 pandemic and related supply-chain shortages, inflation, and strong freight volumes have resulted in high new and used CMV prices for now and the foreseeable future.[11] Given that the majority of ATD members are small businesses and that almost all (98%) of U.S. fleet owners are small businesses, current and foreseeable market conditions are especially concerning. Thus, when evaluating the potentially dramatic market impacts of its NOx proposal, it is incumbent upon EPA to fully evaluate potential impacts on small business dealerships and their small business customers.

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[7] Association for the Work Truck Industry, *Aging Trucks Create More Service Opportunities,* (Nov. 2019).
[8] NADA, *ATD Data 2021 (Midyear Report),* p.8 (2021).
[9] Includes increased operating costs. Ricardo, *Review of EPA NRPM and Compliance Cost Assessment Study*, p.32 (Apr. 25, 2022). An earlier cost study conducted by the National Renewable Energy Laboratory (NREL) on NOx standards being considered by the California Air Resources Board (CARB) reached similar conclusions. NREL, *On-Road Heavy-Duty Low-NOx Technology Cost Study,* p. 60 (May 2020).
[10] 87 Fed. Reg. 17414, 17590.
[11] Equipment Radar, *New & Used Medium & Heavy-Duty Truck Prices Will Likely Continue Rising Amid Components Shortages* (Sept.2021); Fleet Equipment, *Commercial Vehicle Industry Faces An 'Everything' Shortage* (Dec. 2021).

Figure 1 below, which graphs annual retail Class 4-8 CMV sales between 2000 and 2010, shows how prospective new truck purchasers rushed to "pre-buy" trucks equipped with pre-compliant technologies to avoid the cost and performance impacts of EPA's NOx mandates. A surge of orders began in 2002 for the pre-MY 2004 equipment, after which orders slumped significantly. In 2006, orders surged for pre-MY 2007 equipment, and then fell off precipitously. Lastly, in the 2009 timeframe, orders increased for pre-MY 2010 equipped trucks. In each instance, the new CMV marketplace recognized, anticipated, and sought to avoid the higher prices and poorer performance of the phased-in NOx mandate-compliant equipment.

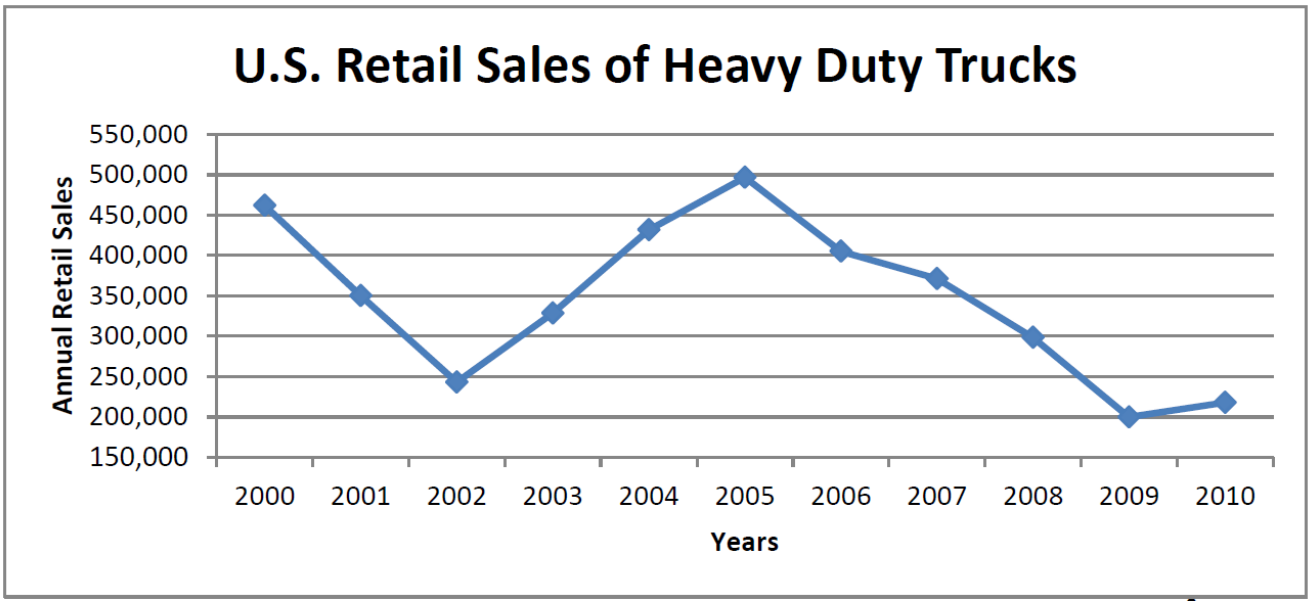

Figure 1 Annual U.S. Retail Sales for Class 4-8 Heavy Duty Trucks

It would be unconscionable for EPA to adopt new NOx mandates that would result in a similar scenario given the negative economic and employment impacts that would result and, as importantly, the lost emissions reduction benefits associated with a slowdown in fleet turnover.

IV. Delaying Fleet Turnover Would Also Undermine the Reliability and Safety of CMVs

In addition to undermining anticipated environmental benefits, delays in CMV fleet turnover caused by new EPA NOx reduction mandates, by increasing the average age of trucks and tractors on the road, will exacerbate reliability and safety concerns. Simply put, older CMVs are, on average, not as clean, green, safe, and reliable as newer vehicles. As noted above and detailed in Appendix B, when faced with higher truck pricing and lower truck performance, prospective new CMV truck customers acted rationally and held on to their older equipment longer. This delayed turnover resulted in an aging fleet largely made up of CMVs built prior to 2004. Figure 2 below indicates that the age of the class 8 fleet increased to 6.6 years, about 11 months older than the historical average dating back to 1979.

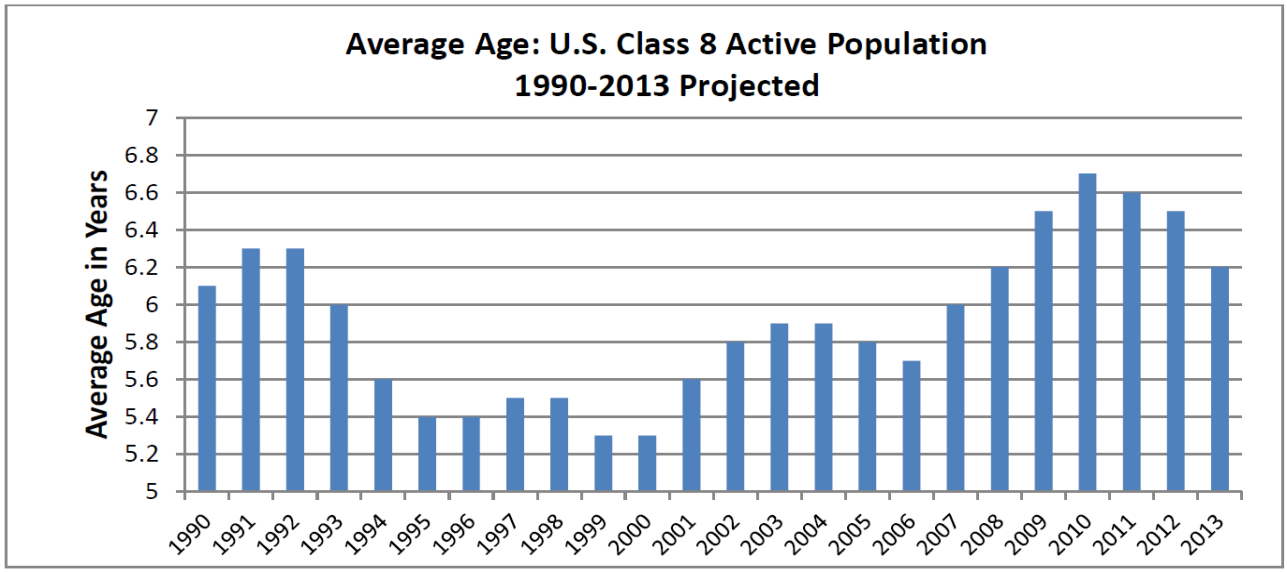

Figure 2 Average Age of Heavy-Duty Truck Fleet 1990-2023

To illustrate the importance of fleet turnover and safety, it was not until 2018 that all major CMV manufacturers began including such advanced driver assistance systems (ADAS) as forward collision avoidance and lane departure warning to standard package offerings. ADAS features have led to a reduction in accidents involving CMVs, along with a reduction in related injuries and deaths. Bottom line: to the extent EPA's new NOx mandates serve to inhibit fleet turnover, they also will inhibit the roll-out of important new accident-reducing features and systems such as ADAS, by no means yet prevalent on the road today.[12]

V. EPA Must Revise Its Proposed Useful Life and Warranty Changes to Help Ensure Market Viability Across Businesses Customers of All Fleet Sizes.

EPA claims that longer useful life periods will result in more durable emission control related components that, combined with longer warranty periods, could reduce repair costs for new CMV purchasers. EPA also suggests that these combined effects may increase new CMV sales (or more likely reduce the decline in sales discussed above).[13] ATD disagrees and instead concurs with the position taken by EMA that the higher costs associated with unreasonably longer useful life mandates would undermine the technological feasibility of a revised NOx rule.

ATD supports *reasonable* revisions to existing HDE/CMV emissions warranty periods. The proposal acknowledges that longer emission warranty periods are likely to increase the purchase price of new CMVs.[14] By definition, an emission warranty is included in the price a first purchaser pays when buying a new CMV. However, given that CMV and HDE OEMs must "pass on" the costs associated with emission warranty (and useful life) mandates, the practical result will be an increase above the prices first purchasers would otherwise pay for the new CMVs and HDEs they buy. ATD also is concerned that new CMV purchasers with short trade cycles will not value and want to "pay for" the incremental cost of lengthy emissions warranties.

[12] According to a Fleet Advantage survey, as of 2020, over 50% of the CMV fleet was MY 2017 and older.
[13] 87 Fed. Reg. 17414, 17590.
[14] *Id*.

VI. On-Board Diagnostic (OBD) System and Serviceability Concerns

As EPA knows, when emissions related sensors and on-board diagnostic systems fail to operate properly, false positive or negative readings may result, frustrating the purpose of those sensors and systems (i.e., the proper diagnosis of potential emission failures) and/or aggravating CMV operators and dealership service personnel alike. Therefore, EPA in conjunction with the HDE and CMV OEMs, should carefully revisit existing CMV HDE OBD requirements in the context of appropriately tighter NOx standards to ensure that they will perform properly in-use. ATD also concurs with the OBD and serviceability issues raised by EMA, including harmonization between EPA and CARB OBD mandates.

Regarding "serviceability," ATD specifically objects to any EPA requirement that:

1. Emissions-related service information be published in owners' manuals given that professional technicians have ready access to such information elsewhere.
2. OEMs prominently "advertise" to CMV owners their right to have emissions-related repairs performed at so-called "independent" repair facilities using third-party components of their choosing. To the contrary, OEMs are and should be free to encourage CMV operators to use original equipment parts and components, and to seek out franchised dealership service departments when in need of emission-related service, thereby helping to protect air quality by both ensuring the proper service and repair of emissions-critical systems, and avoiding emissions tampering.

VII. SCR False Failure and Inducement Concerns

ATD does not oppose the codification of existing guidance that SCR-equipped HDEs require power derating when SCR is not being properly used. Power derating has proven generally to be a reasonable and effective means to ensure that operators perform critical emissions-related scheduled maintenance on the SCR system and that HDEs be operated using quality DEF.[15] At the same time, ATD is concerned that improperly functioning SCR derate inducements can lead safety issues or to operator tampering.

EPA is proposing to require inducements to ensure that SCR systems are designed to be tamper-resistant, thereby reducing the likelihood that they will be circumvented. In addition, EPA is proposing to require monitoring of certain emissions-related components, and the triggering of an inducement if tampering is identified. NADA generally agrees with EPA that a standard list of tampering inducement triggers would aid owners, operators, and fleets in the repair of their vehicles by reducing the cost and time required to diagnose the reason for inducement. At the same time, ATD echoes the concern raised by EMA with respect to revisions to SCR inducement strategies and to allowed minimum maintenance intervals.

[15] *Id* at 17539.

VIII. Conclusion

As discussed above, ATD urges EPA to move forward with a single set of technologically achievable and customer acceptable national HDE NOx standards for MY 2027 and later, while relegating any consideration of new HDE GHG mandates to a separate "Phase 3" rulemaking.

On behalf of ATD, I thank EPA for the opportunity to comment on this matter.

Respectfully submitted,
Douglas I. Greenhaus
V.P., Regulatory Affairs, Environment, Health, and Safety

Attachment

Appendix A: *Letter to Administrator Regan*

May 9, 2022

The Honorable Michael S. Regan
Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

Dear Administrator Regan:

We, the undersigned, have a shared interest in the proposed rule to establish a stronger national standard to reduce nitrogen oxides (NOx) emissions from heavy-duty commercial vehicles. We support the push for cleaner air and healthier communities for all, and stand ready to serve as constructive partners as EPA develops a workable final rule that will achieve those results.

To that end, we strongly encourage you to keep two key considerations in mind as you work toward a final rule.

First, cleaner air and healthier communities for all require replacing older trucks and buses with newer ones. Today, roughly half of the trucks on the road were built before 2010, and those older vehicles emit significantly more air pollutants than modern trucks equipped with effective emission reduction technology. If the new rule does not facilitate the development of affordable, durable commercial vehicles that can meet customer needs, fleet owners are more likely to hold onto their older, higher-emitting vehicles longer – which could result in the loss of good-paying jobs. Most importantly, that also would delay the cleanest trucks and buses from hitting the road and cause further harm in communities near highways, ports, and warehouses that historically and currently suffer from the highest concentration of air pollution.

Second, we must ensure the final rule serves as a bridge, not a potential barrier, to a zero-emissions future. Zero Emission Vehicles (ZEVs) will eliminate all tailpipe emissions and greatly benefit public health. However, ZEV technology still is in its infancy. While the industry is investing heavily in a zero-emissions future, the high costs of zero-emission trucks and buses and the lack of the essential national recharging/refueling infrastructure needed to operate those vehicles virtually guarantees that fleets cannot yet make the switch to zero. We must invest in a comprehensive strategy to build the nationwide infrastructure that is essential to support widespread ZEV adoption while also providing fleet owners – 97% of which are small businesses – with the incentives necessary to offset the higher costs of ZEVs.

We are committed to partnering with EPA and other stakeholders to further reduce emissions from heavy-duty commercial vehicles and foster a phased transition to ZEVs. We look forward to working with you to finalize a cost-effective rule – informed by data and science – that will further reduce emissions, protect American jobs, and result in cleaner air and healthier communities for all.

Sincerely,

AMERICAN BAKERS ASSOCIATION
AMERICAN BEVERAGE
ABA AMERICAN BUS ASSOCIATION
The American Cotton Producers of the National Cotton Council
ATA
ATD AMERICAN TRUCK DEALERS A DIVISION OF NADA
CONSUMER ENERGY ALLIANCE
Cummins
DAIMLER TRUCK North America
DIESEL TECHNOLOGY FORUM
GAWDA GASES AND WELDING DISTRIBUTORS ASSOCIATION

American Bakers Association
American Beverage Association
American Bus Association
American Cotton Producers
American Truck Dealers (ATD, a division of NADA)
American Trucking Associations
Consumer Energy Alliance
Cummins Inc.
Daimler Truck North America LLC
Diesel Technology Forum
Gases and Welding Distributors Association
Leather and Hide Council of America
Meat Import Council of America
NAFA Fleet Management Association
Navistar, Inc.
National Association of Manufacturers
National Aquaculture Association
National Cotton Council
National Cotton Ginners Association
National Energy & Fuels Institute
National Private Truck Council (NPTC)
North American Meat Institute
NTEA — The Association for the Work Truck Industry
PACCAR Inc
Reusable Industrial Packaging Association
Truck & Engine Manufacturers Association
Truck Renting and Leasing Association
Truckload Carriers Association
U.S. Chamber of Commerce
Volvo Group North America

Appendix B: *A Look Back at EPA's Cost and Other Impact Projections for My 2004-2010 Heavy-Duty Truck Emissions Standards*

A LOOK BACK AT EPA'S COST AND OTHER IMPACT PROJECTIONS FOR MY 2004-2010 HEAVY-DUTY TRUCK EMISSIONS STANDARDS

Calpin and Plaza-Jennings

2/13/2012

A LOOK BACK AT EPA'S COST AND OTHER IMPACT PROJECTIONS FOR MY 2004-2010 HEAVY-DUTY TRUCK EMISSIONS STANDARDS

Patrick Calpin, Esteban Plaza-Jennings
American Truck Dealers
February 2012

ABSTRACT:

In 1997, 2000, and 2001, the U.S. Environmental Protection Agency (EPA) published rules establishing a series of new emissions mandates for heavy-duty trucks to be phased-in between model years (MY) 2004 and 2010.[1] Typical of EPA's motor vehicle standards, these "technology forcing" mandates analyzed the development and implementation of new emission control strategies and technologies.

The adoption of these new control strategies and technologies directly resulted in higher prices for new heavy-duty trucks. These mandates also resulted in significantly higher operating costs, attributable largely to increased maintenance requirements, reduced reliability, and lower fuel economy. Together, these higher prices and operating costs led to significant disruptions in the new truck marketplace. These included significant layoffs caused by unprecedented truck pre-buys and sales "cliffs," capital constraints for truck and engine manufacturers (OEMs), suppliers, and dealers; and the departure of certain businesses from the heavy-duty truck market.

This paper examines the degree to which, and possible reasons why, EPA's estimated regulatory impact dramatically underestimated real world costs of the regulation. An analysis of actual sales data, including cost escalators associated with the MY 2004-10 standards, shows that EPA underestimated compliance costs by a ***factor of 2-5***. These higher-than-projected costs resulted in, among other things, significantly lower-than-projected new truck sales which necessarily reduced the environmental benefits associated with these standards. While it is an important issue, this paper does not attempt to quantify the degree to which EPA's projected environmental benefits were not realized.

I. THE 2004-2010 TRUCK EMISSIONS MANDATES

As shown in Table 1, the MY 2004-10 truck standards largely were designed to reduce emissions of three diesel fuel combustion byproducts; nitrogen oxides (NOx); particulate matter (PM), and non-methane hydrocarbons (NMHC). A 1998 legal settlement required seven truck engine OEMs to comply with the MY 2004 mandates two years early (MY 2002). All other engine and truck OEMs began compliance starting with MY 2004.

The second set of mandates began to phase-in in MY 2007. As shown in Table 1, they were designed to reduce MY 2002-04 emissions by roughly 90 percent. The 0.01 g/bhp-hr. PM standard took effect in 2007, with tighter NOx and NMHC standards phased in over three years.

[1] 62 Fed. Reg. 54694, *et seq.* (October, 21, 1997); 65 Fed. Reg. 59896, *et seq.* (October 6, 2000); 66 Fed. Reg. 5001, *et seq.* (January 18, 2001). The model year for heavy-duty trucks typically begins on January 1 (*ie.*, MY 2004 runs from 1/1/04-12/31/04).

Table 1: EPA MY 2004-10 Truck Emissions Targets

Regulation	NOx	PM	NMHC
2004	2.5 g/bhp-hr	0.10 g/bhp-hr	2.5 g/bhp-hr
2007-10	1.2- 0.20 g/bhp-hr	0.01 g/bhp-hr	0.14 g/bhp-hr

To meet the MY 2002-10 mandates, engine and truck OEMs had to design, test, and incorporate a host of new strategies and technologies. Cooled exhaust gas recirculation (EGR), which reduces NOx emissions by displacing oxygen with inert gases during combustion, was the primary compliance strategy for almost all truck and engine OEMs. EGR often necessitated that changes be made to the trucks themselves (e.g., to accommodate larger cooling systems). To address tighter MY 2007-10 NOx standards, most engine and truck OEMs chose selective catalytic reduction (SCR), an aftertreatment strategy that reduces emissions by injecting a catalyst or diesel exhaust fluid (DEF) into the exhaust stream. PM emission reductions were addressed largely with aftertreatment technologies such as filters and traps.

II. THE REACTION OF NEW TRUCK CUSTOMERS TO EPA'S STANDARDS

Implementation of EPA's MY 2004-2010 emissions mandates directly resulted in higher truck prices, increased operating costs, reduced reliability, and lower fuel economy performance, which caused dramatic disruptions to the new truck marketplace. As detailed later in this paper, EPA's regulatory analyses grossly underestimated these impacts or missed them altogether.

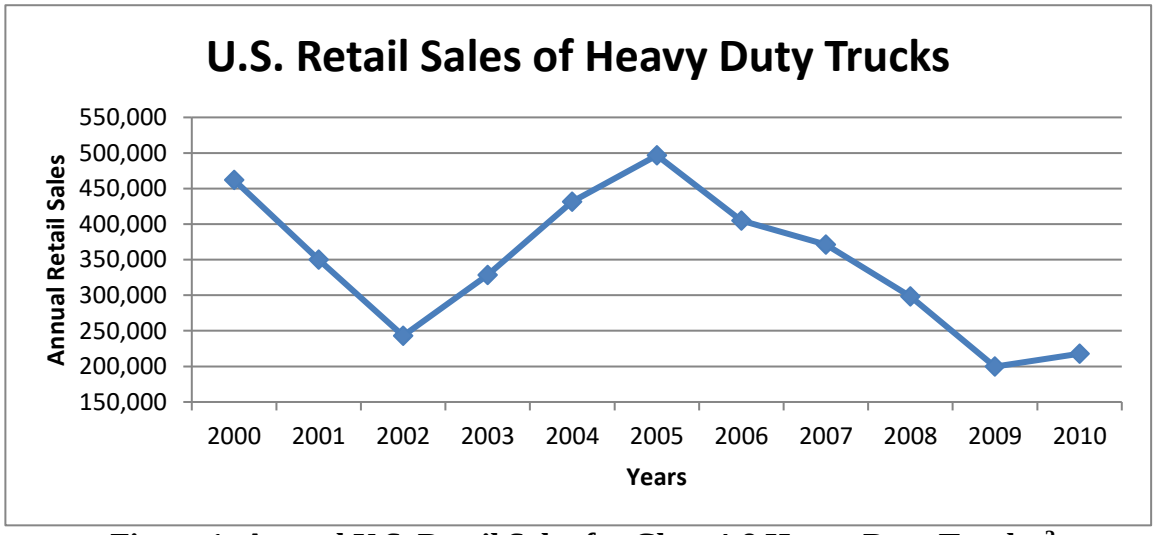

Figure 1: Annual U.S. Retail Sales for Class 4-8 Heavy-Duty Trucks.[2]

Many informed prospective new truck purchasers rushed to "pre-buy" trucks with pre-compliant technologies to avoid the effects of EPA's mandates. As seen in Figure 1 below, a surge of orders came in for pre-MY 2004 equipment, after which orders slumped significantly. Also, in 2006, orders surged for pre-MY 2007 equipment, and then fell off precipitously. Lastly, in the 2009 time-frame, orders poured in for pre-MY 2010 equipped trucks.[3] In each instance,

[2]All data from Ward's Communications.
[3] Jim Mele, *Economists See Milder Pre-Buy in '09,* Fleet Owner (January 22, 2008).

the marketplace anticipated and sought to avoid the higher prices and poorer performance of compliant technologies. As detailed later in this section, these marketplace distortions led to employment swings, capital constraints, and even some business failures[4].

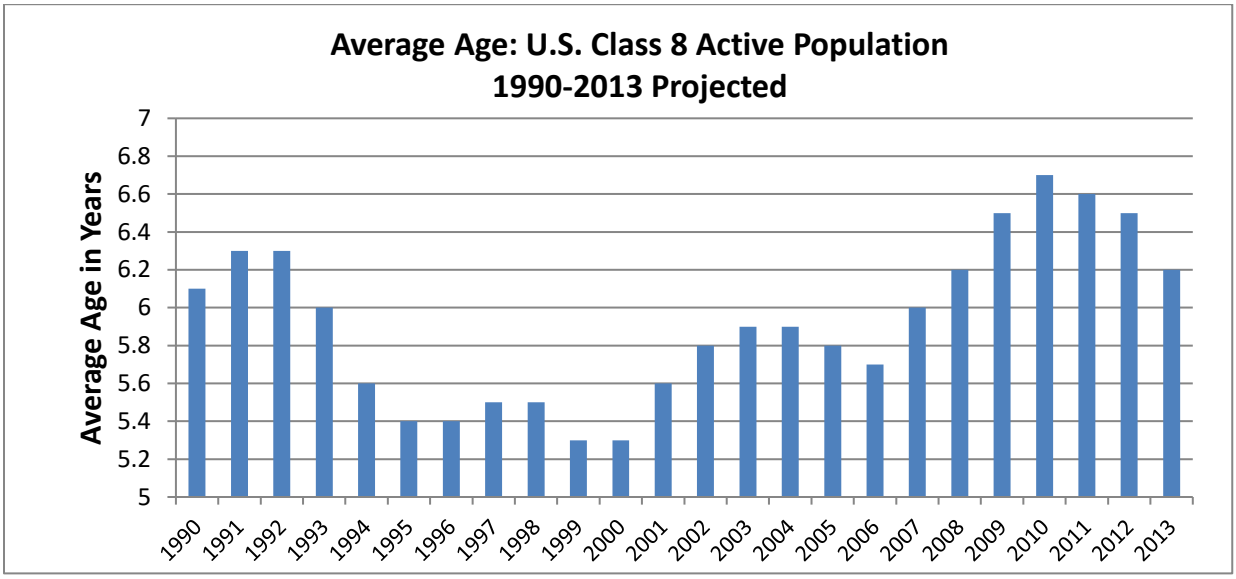

Figure 2: Average Age of Heavy-Duty Truck Fleet 1990-2013[5]

A National Economic Research Associates (NERA) survey concluded that pre-buy purchases made in anticipation of the MY 2007 standards totaled an additional 104,077 units in 2005 and 2006.[6] This was followed by a decline of 149,272 units in 2007 and 2008.[7] The pre-buy in 2009 was less pronounced and somewhat difficult to separate out from a significant decline in commercial truck demand that year related to the severity of the economic recession. In fact, sales of Class 8 trucks hit their lowest level since 1991.[8] In addition, many operators elected to hold onto their older trucks for longer than they otherwise would have, predictably incurring the higher operating costs and reliability risks of doing so. When faced with higher truck pricing and lower truck performance, prospective new truck customers acted rationally. This reluctance to buy new trucks has resulted in an aging truck fleet largely made up of trucks built prior to 2004. As evidenced by Figure 2 below, the commercial truck fleet now averages 6.6 years of age, about 11 months older than the historical average dating back to 1979.[9] This

[4]Truck and engine OEMs temporarily or permanently exiting the heavy-duty market at least in part due to EPA's mandates include Caterpillar Inc., Sterling Trucks, General Motors Medium-Duty Truck (Chevrolet/GMC), Mitsubishi-Fuso Truck of America, Inc., Hino Trucks, and UD Trucks Co.

[5]Saum, Chairman, Beltway Companies, presentation to Diesel Technology Forum, June 17, 2011, graphic by ACT Research, LLC.

[6] NERA, *Customer Behavior in Response to the 2007 Heavy-Duty Engine Emission Standards: Implications for the 2010 NOx Standard*, page 11. (November 14, 2008).

[7] Ibid.

[8] Commercial trucks generally are categorized by gross vehicle weight rating (GVWR) and vehicle class. EPA further defines "heavy-duty vehicles" as light heavy-duty (Classes 2B-5; 8,500-19,500 GVWR), medium heavy-duty (Classes 6-7; 19,501-33,000 GVWR) and heavy heavy-duty (Class 8; 33,001and above GVWR).

[9] Daley and Clothier, *Oldest Trucks Since 1979 May Mean Output to Rise 56%*, Bloomberg (November, 19, 2010).

aging fleet of older, higher polluting trucks is counterproductive to the pollution reduction targets EPA hoped to meet with its mandates.[10]

These pre-buys and decisions by operators to keep older trucks longer had a significant economic impact. EPA acknowledged the market disruptions caused by the new regulations but waved them off as business cycle activity not necessarily related to the new emissions standards.[11] This was hardly the case as the pre-buys occurred in tandem with the new emissions mandates. For example, when faced with declining sales following the pre-buy, Volvo laid off 300 workers in March of 2001 and another 300 workers in April of that year.[12] In 2006, Volvo's Deputy Chief Executive Officer warned that the new environmental regulations would cause such a precipitous decline in sales that Volvo would have no choice but to lay off more people.[13] Volvo ended up laying off nearly 600 workers in 2006; the direct result of the new emissions mandates.[14] Also in 2006, Peterbilt cut their workforce by almost half.[15] Freightliner laid off nearly 1,800 workers in 2007,[16] followed by another layoff of 2,100 workers, and the complete shut down a manufacturing plant in 2009.[17]

Fleet purchasers echo these numbers. Fleets pre-bought new trucks in 2006 to reduce their average fleet age in preparation for the MY 2007 standards.[18] Fleet managers cited concerns over cost and decreased reliability as a main motivating factor. [19] As noted above, in addition to causing significant economic disruptions, these pre-buy/cliff cycles concurrently reduced projected environmental benefits as the adoption of new and more environmentally friendly technologies was delayed.

Other prospective purchasers turned to the used truck market.[20] Additionally, there has been a surge in truck rebuilding activity, often involving glider kits.[21] Glider kits are new truck frames and bodies typically married to used or rebuilt powertrain and suspension components. Like with used trucks, glider kits do not use new technology engines, further reducing the environmental benefits predicted by EPA to result from its standards. [22]

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[10] Thornton, Dorothy, *et. al*. *Compliance costs, regulation and environmental performance: Controlling truck emissions in the US.* Regulation & Governance (2008).
[11] Diesel Progress, *10 Questions with Margo Oge, Office of Transportation and Air Quality*, EPA (February 2007).
[12] The Roanoke Times, *More Layoffs Ahead at Volvo* (March 29, 2001).
[13] Forbes.com, *Big Trucks on a Bumpy Road* (November 16, 2006).
[14] The Sun, *Volvo to Lay Off 600 at Hagerstown Plant* (October 28, 2006)
[15] The Tennessean, *Peterbilt to Cut Ranks by Half* (November 28, 2006)
[16] Napa Valley Register, *Truck Maker Announces Layoffs* (January 28, 2007).
[17] World Truck News, *Freightliner Plans Massive Charlotte-Area Layoff* (January 28, 2009).
[18] Tire Business, *Strong Economy Bodes Well for Trucking*, (January 2, 2006)
[19] Leone, *Carriers Split Viewpoints on Benefits Of Buying Before 2010 Regulations*, Transport Topics (March 24, 2008).
[20] Owner-Operators Independent Drivers Association (OOIDA) data shows that the percentage of its members buying new trucks has dropped by 30 percent. Scott Grenerth (Professional driver and member of OOIDA), Testimony before the House Committee on Oversight and Government Reform, (October 12, 2011).
[21] Transport Topics, *Glider Kits Give New Life to Trusty, Older Trucks* (January 17, 2011).
[22] When the marketplace avoids EPA-mandated vehicles, it both diminishes projected environmental benefits and calls into question EPA's estimates of private benefits and costs. This is also a concern with EPA's MY 2017-2025 light-duty greenhouse gas (GHG) proposal and the expected second round of GHG rules for commercial trucks.

III. EPA'S PROJECTED COSTS OF COMPLIANCE

1. Fixed Costs

EPA conducted studies analyzing and projecting the effects of the MY 2004-10 rules.[23] Projected regulatory benefits included improved environmental quality and human health, while projected costs[24] focused on control strategies and technologies necessary for compliance. EPA broke out its projected compliance costs for light heavy-duty, medium heavy-duty, and heavy heavy-duty trucks and engines. Due to data constraints, this paper examines only the projected and actual compliance costs associated with medium heavy-duty and heavy heavy-duty trucks.

EPA's cost projections were made for a nine-year time frame and accounted for decreasing fixed and variable costs. As shown in Table 2 for heavy heavy-duty trucks, EPA projected that MY 2004-2005 trucks meeting MY 2004 standards would incur average costs of $803. For MYs 2006-2008, EPA projected a $688 average per vehicle MY 2004 standards compliance cost, with the decrease due to a 20 percent learning curve on fixed costs. For MYs 2009-2012, EPA projected average per vehicle MY 2004 compliance costs of $368, a decrease reflecting the expiration of fixed costs by MY 2009, and a 20 percent learning curve for variable costs.

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[23] EPA, *Final Regulatory Impact Analysis: Control of Emissions of Air Pollution from Highway Heavy-Duty Engines*, (September, 1997); EPA, *Regulatory Impact Analysis: Control of Emissions on Air Pollution from Highway Heavy-Duty Engines*, EPA 420-R-00-010 (July 2000); EPA, *Regulatory Impact Analysis: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements*, EPA 420-R-00-026 (December 2000).

[24] EPA's projected costs appear to represent an average marginal cost/per truck based on a Retail Price Equivalent (RPE) for emission control technologies. Specifically:

> Costs of control include variable costs (for incremental hardware costs, assembly costs, and associated markups) and fixed costs (for tooling, R&D, and certification). For technologies sold by a supplier to the engine manufacturers, costs are either estimated based upon a direct cost to manufacture the system components plus a 29 percent markup to account for the supplier's overhead and profit, or when available, based upon estimates from suppliers on expected total costs to the manufacturers (inclusive of markups). Estimated variable costs for new technologies include a markup to account for increased warranty costs. Variable costs are additionally marked up to account for both manufacturer and dealer overhead and carrying costs. The manufacturer's carrying cost was estimated to be four percent of the direct costs accounting for the capital cost of the extra inventory, and the incremental costs of insurance, handling, and storage. The dealer's carrying cost was marked up three percent reflecting the cost of capital tied up in inventory.
>
> EPA, *RIA*, EPA 420-R-00-026 at v-2 (December 2000).

Neither EPA's projected costs nor the actual costs discussed here-in include the application of the 12% federal excise tax or state sales taxes.

Table 2: EPA's Projected Heavy Heavy-Duty Compliance Costs (Costs are in 1999 dollars)

MY Year	2004 Standards[25]	2007-10 Standards[26]
2004	$803	N/A
2005	$803	N/A
2006	$688	N/A
2007	$688	$3,227
2008	$688	$3,227
2009	$368	$2,618
2010	$368	$2,618
2011	$368	$2,618
2012	$368	$1,866

Table 2 also shows similar EPA projections for the MY 2007-10 standards, suggesting that for MYs 2007-2008, the average per vehicle cost of compliance would be $3,227. Due to an assumed 20 percent learning curve on fixed costs, EPA projected this average per vehicle cost would drop to $2,618 for trucks built in MYs 2009-11. For MY 2012, EPA projected average per vehicle compliance costs for the MY 2007-10 standards to decline to $1,866, the result of a 20 percent learning curve applied to the variable costs.

EPA conducted similar cost projections with similar adjustment factors for medium heavy-duty trucks and engines. Table 3 shows projected average medium heavy-duty truck costs of $657 to meet the MY 2004 standards for MYs 2004-2005, dropping to $571 for MYs 2006-2008, and dropping further to $275 for trucks built in MYs 2009-2012.

Table 3: EPA's Projected Medium Heavy-Duty Compliance Costs (Costs are in 1999 dollars)

Year	2004 Standards[27]	2007-10 Standards[28]
2004	$657	N/A
2005	$657	N/A
2006	$571	N/A
2007	$571	$2,564
2008	$571	$2,564
2009	$275	$2,096
2010	$275	$2,096
2011	$275	$2,096
2012	$275	$1,412

[25] EPA, *RIA*, EPA 420-R-00-010 at 88 (July 2000). EPA only gives cost estimates for the 2004, 2006, and 2009 MYs. Based on an oral conversation with EPA staff, Table 2 uses these same numbers to fill the gaps in between.
[26] EPA, *RIA*, EPA 420-R-00-026 at V-38 (December 2000). EPA only gives cost estimates for the 2007, 2009, and 2012 MYs. Based on an oral conversation with EPA staff, Table 2 uses the same numbers to fill the gaps in between.
[27] See footnote 25.
[28] See footnote 26.

Table 3 also shows EPA's projected average medium heavy-duty truck compliance costs for the MY 2007-10 standards to be $2,564 for MYs 2007-2008, $2,096 for MYs 2009-2011, and $1,412 for trucks built for MY 2012.

2. Operating Costs

In addition to projecting direct vehicle cost increases, EPA estimated some of the indirect costs associated with its mandates, designating them as "life-cycle operating costs." According to EPA,

> Operating costs include the cost for vehicle and engine maintenance, and the cost for vehicle consumables such as fuel, oil, filters and tires. The new standards and technologies introduced beginning in 2007 are expected to change vehicle operating costs.[29]

Indeed, EPA estimated increased life-cycle operating costs of $3,785[30] for a MY 2007 Class 8 truck, in *addition* to a $3,227 higher up front price. This paper does not attempt to compare EPA's estimated life-cycle operating costs to actual operating costs. However, data suggests that DPF and trap maintenance intervals have occurred much more often than projected, at $300-500 per service. This is particularly true for units in vocational use.[31] Moreover, the lost earnings associated with trucks out of service, due to reliability issues, far exceed any service and parts costs associated with these mandates. As discussed below, real and perceived increased operating costs, along with real and perceived declines in performance, significantly contributed to the marketplace disruptions arising from EPA's standards.

IV. ACTUAL PER TRUCK COMPLIANCE COSTS VS. EPA COST PROJECTIONS

Actual individual sales data and widely reported pricing information paint a clear picture of the higher per truck costs resulting from compliance with EPA's mandates. The primary data used in this paper to analyze actual per truck costs were individual sales invoices and OEM sales documents covering truck sales involving the majority of heavy-duty truck and engine OEMs.[32] Many invoices contained specific cost line items (surcharges or escalators) delineating cost increases attributable to the MY 2004-10 mandates. These surcharges are understood to reflect the wholesale costs (to the dealer) of the emission reduction strategies and technologies used. They do not include dealer mark-ups (if any) or taxes.

For example, certain Western Star truck invoices listed specific escalators labeled "2002/2004 Engine Emissions Escalator...$4,148.00." and certain Volvo invoices read "2007 EPA surcharge net/net no discount…$7,500" A November 20, 2009, Peterbilt dealer bulletin detailing 2010 pricing read, in part:

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[29] EPA, *RIA, EPA 420-R-00-026* at V-29 (December 2000).
[30] EPA life-cycle operating costs, in 1999 dollars, do not include increased fuel economy costs.
[31] Steve Sturgess, *2010 DPF Maintenance*, Trucking Info (January 22, 2010).
[32] The number of surcharge data points do not represent all potentially available data for all regulated truck OEMS, but rather data readily available from surveyed dealers.

> Effective with the January 1, 2010, price level, a surcharge will be added to the invoice for chassis built with a 2010 EPA emissions compliant after-treatment. This surcharge is non-discountable and will be applied as follows: ISX…$9,250 Surcharge…ISL, PX-8, PX-6 - $7,000.

Figure 3 below shows the average surcharge, by OEM, for MY 2010 compliant heavy heavy-duty trucks. These escalators account only for costs associated with the MY 2010 round of emissions mandates. According to vehicle/engine manufacturers, compliance costs associated with the MY 2004 and MY 2007 mandates were incorporated into base invoice price of MY 2010 compliant trucks.[33] The EPA comparative cost projection shown also does not include compliance costs for the MY 2004 and MY 2007 standards. *On average, actual cost increases for MY 2010 compliant heavy heavy-duty trucks were nearly three times what EPA projected.*

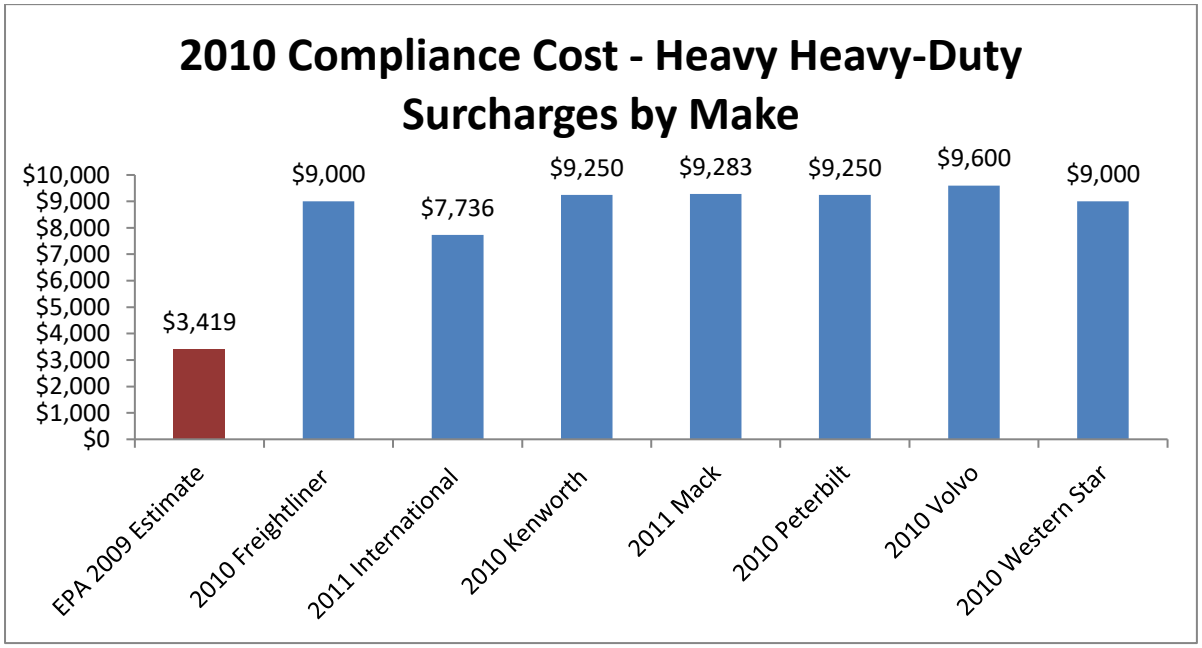


Figure 3: 2010 Compliant Heavy Heavy-Duty Surcharges by OEM.[34]

Figure 4 below shows the average MY 2010 surcharge, by OEM, associated with MY 2010 compliant medium heavy-duty trucks. Again, EPA's projection, provided by comparison,

[33] In other words, the surcharges only account for the costs associated with meeting a specific level of emission standards. For example, the 2004 surcharge accounts for the 2.5 g/bhp-hr NOx standard (figure 6), the 2007 surcharge accounts for the 1.2 g/bhp- hr NOx standard (figure 5), and the 2010 surcharge accounts for the 0.20 g/bhp- hr NOx standard (figures 3 & 4). In order to calculate total regulatory costs, these incremental costs must be added together.

[34] The X-axis lists truck OEMs and year of invoice. The Y-axis lists per vehicle regulatory compliance premiums. Dollars are standardized to 2010 with surcharges adjusted for inflation. The EPA estimate is a MY 2009 projection made in December 2000, inflation adjusted. This is used because EPA only made per vehicle cost increase estimates for MY 2007, 2009, and 2012. Figure 3 uses the 2009 cost increase to be conservative, since using the 2012 estimate would likely undervalue EPA's cost predictions for MY 2010 trucks.

does not include MY 2004 and MY 2007 compliance costs. *On average, actual cost increases for MY 2010 compliant medium heavy-duty trucks were over two times what EPA projected.*

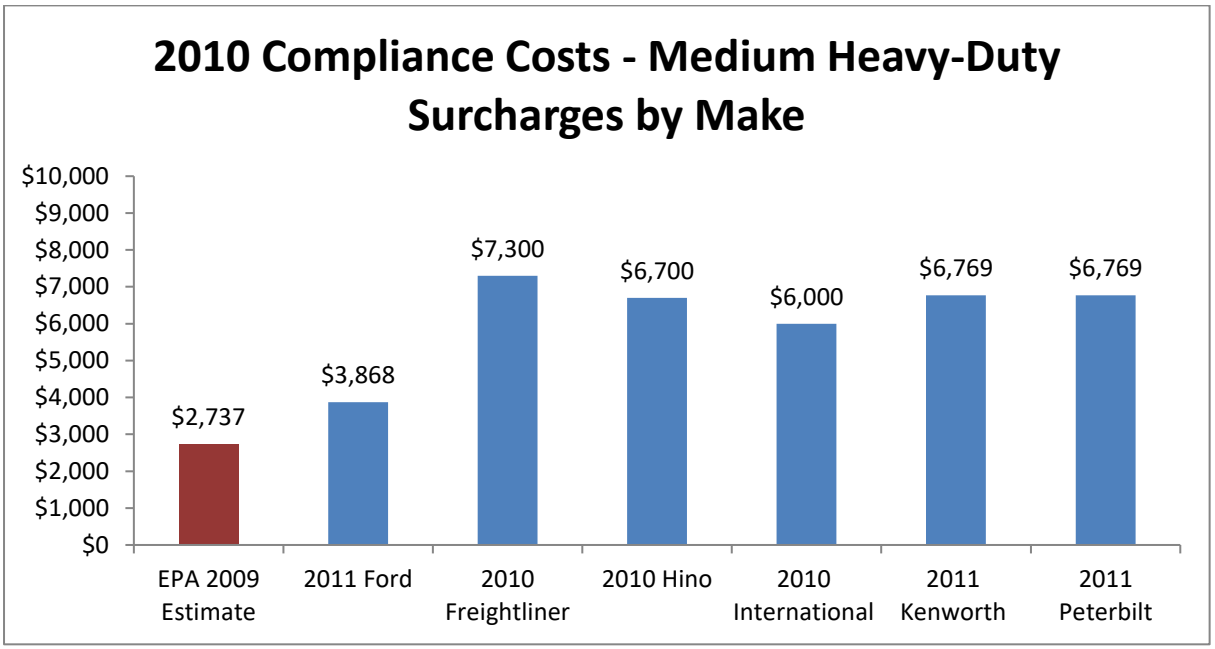
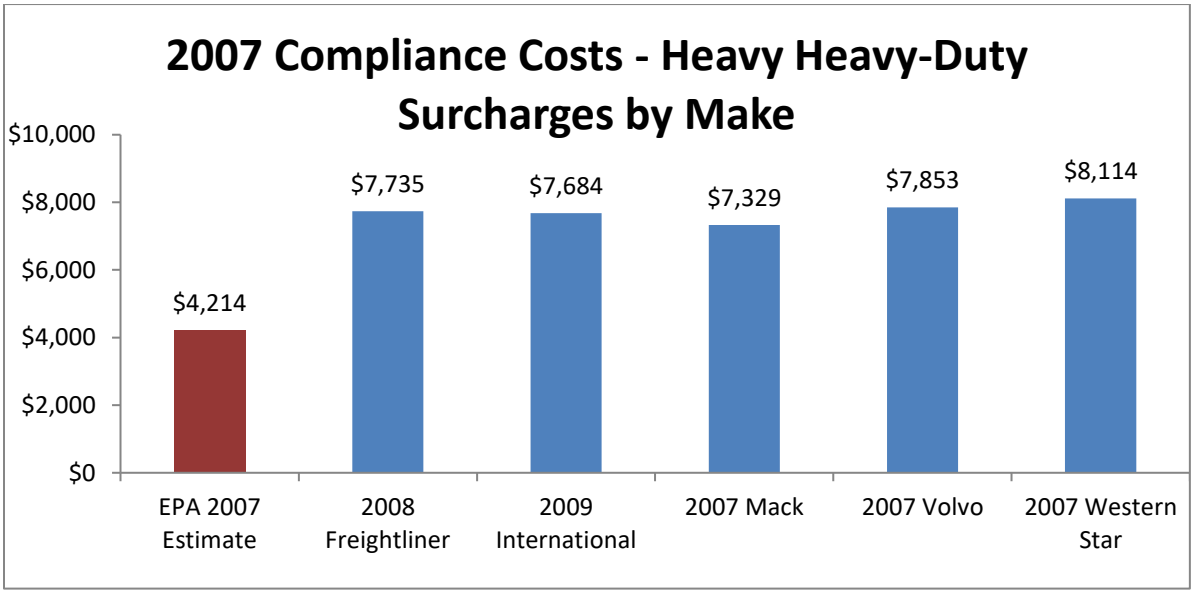


Figure 4: 2010 Compliant Medium Heavy-Duty Surcharges by OEM.[35]

Figure 5 below shows the average MY 2007 surcharge, by OEM, associated with MY 2007 compliant heavy heavy-duty trucks. Again, EPA's projection, provided by comparison, does not include MY 2004 compliance costs. *On average, actual cost increases for MY 2007 compliant medium heavy-duty trucks were nearly two times what EPA projected.*



[35] Please see foot note 34.

Figure 5: 2007 Compliant Heavy Heavy-Duty Surcharges by Truck OEM[36]

Figure 6 below shows the average MY 2004 compliant surcharge, by OEM, associated with MY 2004 compliant medium heavy-duty trucks, along with EPA's projection. *On average, actual cost increases for MY 2004 compliant heavy heavy-duty trucks were up to five times what EPA projected.*

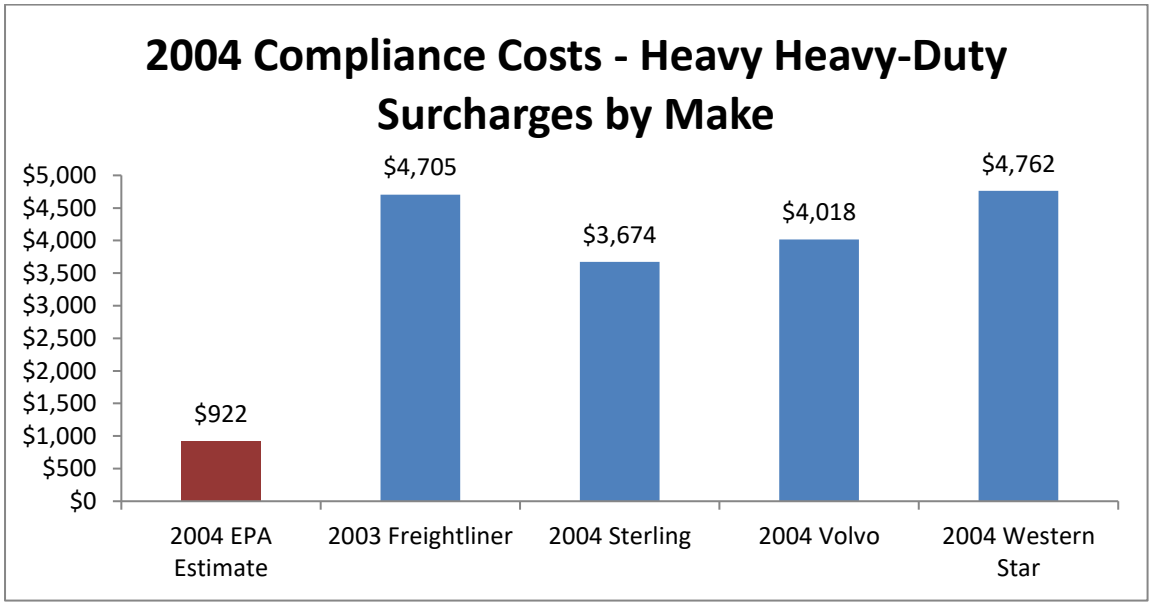


Figure 6: 2004 Compliant Heavy Heavy-Duty Surcharges by Truck OEM[37]

Figures 3-6 show that EPA's cost analyses underestimated *by two to five times* the actual costs of compliance with the MY2004-10 truck emissions mandates. As shown in Figure 7 below, it is possible to total up average per truck compliance costs for the MY 2004-2010 standards. According to representatives from various manufacturers, this comparison is appropriate because, as described above, each round of surcharges does not include costs incurred to comply with the prior round(s) of emissions mandates. *A comparison of EPA's total projected costs for heavy heavy-duty trucks versus actual data for four OEMs shows that on average, actual cost increases were 4 times what EPA projected.*[38]

[36]The X-axis lists truck OEM and year of invoice. The Y-axis lists the per vehicle regulatory compliance premium. Dollars are standardized to 2010 with surcharges adjusted for inflation. Notably, a 2005/2008 retrospective study conducted by NERA Economic Consulting and Air Improvement Resource, Inc. similarly projected that, on average, heavy heavy-duty truck prices would increase by $7,000 to meet the MY 2007 standards.

[37] The X-axis lists truck OEM and year of invoice. The Y-axis lists the per vehicle regulatory compliance premiums. Dollars are standardized to 2010 with surcharges adjusted for inflation. EPA's MY 2004 estimate is based on its first year projection for a MY 2004 compliant vehicle. See Table 3. The 2003 Freightliner invoice is comparable to the MY 2004 EPA as both reflect compliance with the same standard.

[38] OOIDA attempted to calculate a total average per truck regulatory cost figure associated with the MY 2004-2010 standards. OOIDA's analysis, based on MSRP values and increased warranty costs, calculates that EPA's rules caused truck prices and warranty costs to increase an average of $20,000-30,000. Scott Grenerth (Professional driver and member of OOIDA), Testimony before the House Committee on Oversight and Government Reform, (October 12, 2011).

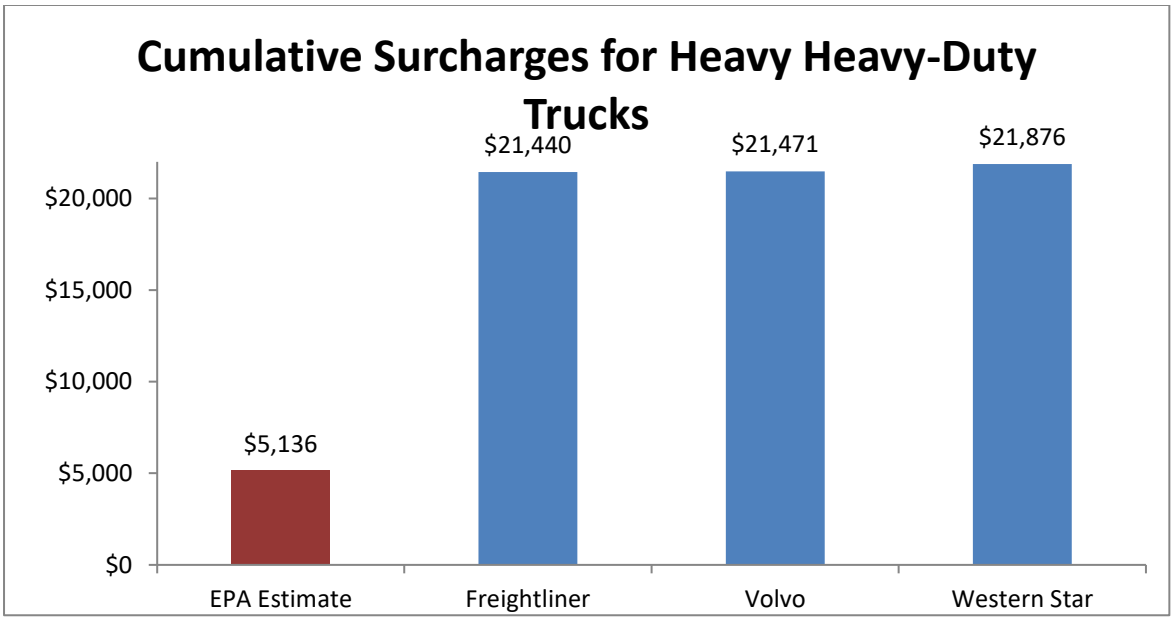


Figure 7: EPA Projection of Total MY 2004-2010 Heavy Heavy-Duty Compliance Costs Compared To Actual Total Surcharges for Three OEMs[39]

V. OTHER CONCERNS ARISING OUT OF EPA'S MY 2004-2010 TRUCK EMISSIONS MANDATES THAT CONTRIBUTED TO MARKETPLACE DISRUPTIONS

1. Decreased Truck/Engine Reliability

In 2000, EPA stated that, "engine manufacturers have been very successful in developing a mix of technologies to lower PM and NOx concurrently while continuing to improve fuel economy and engine durability."[40] This may have been the case up until the MY 2004-2010 standards took effect, but experience with their implementation paints a different picture. Particularly with respect to trucks and engines designed to meet MY 2004 and 2007 standards, fleets and owner-operators have experienced significant reliability, operating cost, and fuel economy concerns. A recent J.D. Power and Associates study suggests that:

> With the new technology required to meet emissions standards, today's engines simply are more problematic than the previous generation. So, while it's possible that manufacturers can continue to improve the quality of the engines, it's unlikely that they'll quickly get back to the pre-2004 levels.[41]

J.D. Power's conclusions are supported by individual fleet experiences. For example, it has been reported that for the eighth largest carrier in the U.S., "maintenance costs for Schneider's 2007

[39] EPA's estimate is the sum of projected MY 2004, 2007, 2010 costs. Actual compliance cost totals are the sum of each OEM's MY 2004, 2007, and 2010 surcharges. All numbers are adjusted for inflation to 2010 dollars. The three OEMs shown are the only ones for which surcharge data was available for all three compliance rounds.
[40] EPA, *RIA*, EPA 420-R-00-010 at 26 (July 2000).
[41] J.D. Power, *Heavy-duty Engine Quality, Satisfaction Up Since Last Year*, Commercial Carrier Journal (September 1, 2011)

model trucks were about 28.2% higher than vehicles manufactured before October 2002."[42] Reliability is critical for commercial fleets and owner-operators both because of the costs of keeping trucks in operation and the even greater potential costs associated with out-of-service equipment.[43] In addition to higher truck prices and operating costs, anticipated reliability issues are often cited as contributing to the marketplace disruptions discussed herein.[44]

2. Decreased Fuel Economy Performance

For its MY 2004 rule, EPA projected that fuel injection and variable geometry turbochargers would offset the fuel economy penalties of EGR systems. In fact, EPA even projected that its MY 2004 rules would decrease fuel consumption by as much as 1.5 percent.[45] For its MY 2007-2010 rule, EPA projected no declines in fuel economy performance.[46]

EGR systems may be effective at reducing NOx emissions, but they undeniably reduce the fuel economy performance that would otherwise have been achieved. For example, Judy McTigue, director of marketing and planning research for Kenworth Trucks, stated that "2007-compliant engines equipped with exhaust gas recirculation systems suffered a fuel economy penalty of 5% to 9%."[47] EGR systems also contributed to a loss of 50 to 100 horsepower from heavy-duty engines.[48] According to OOIDA, this fuel economy penalty equates to a truck consuming an extra 800 additional gallons of fuel per year, on average.[49] At $4.00/per gallon, that is an extra $3,200/year/truck that EPA failed to account for in its projections. In addition, EPA also failed to account for the proportionate amount of extra GHGs emitted, ironic given that the agency has since issued a rule governing GHGs from commercial trucks and is in the process of developing a second. Not unlike reliability concerns and higher prices, lower fuel economy performance is often cited as a major reason why fleets and owner-operators avoided purchasing trucks equipped with engines designed to meet the MY 2004 and 2007 standards. Subsequent introduction of SCR has mitigated EGR-related fuel economy performance degradations, but the new truck fleet has yet to reach pre-MY 2004 fuel economy levels.[50]

VI. LESSONS LEARNED: EXPLAINING EPA'S GROSS UNDERESTIMATIONS

In light of the dramatic marketplace impacts that directly resulted from the actual regulatory costs associated with EPA's MY 2004-2010 truck emissions mandates, it is

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[42] Leone, *Carriers Split Viewpoints on Benefits Of Buying Before 2010 Regulations,* Transport Topics (March 24, 2008).
[43] Scott Grenerth (Professional driver and member of OOIDA), Testimony before the House Committee on Oversight and Government Reform, (October 12, 2011).
[44]Deborah Lockridge, *The Pre-Buy Ride*, Heavy Duty Trucking (August, 2007).
[45] EPA, *RIA, EPA 420-R-00-010* at 85 (July 2000).
[46] EPA, *RIA*, EPA 420-R-00-026 at V-29 (December 2000).
[47] Fleet Owner, *Dealing with DEF*, (October 22, 2010).
[48] Ibid
[49] U.S. House, Committee on Oversight and Government Reform, Sub-Committee on Regulatory Affairs, Stimulus Oversight, and Government Spending, *Running on Empty How the Obama Administration's Green Energy Gamble Will Impact Small Business &* Consumers, Hearing (October 10, 2011).
[50]Volvo Trucks North America, *SCR and Fuel Efficiency* (2009)

incumbent upon the agency to review and resolve the flaws with its cost projection methodology. By misjudging future regulatory costs, EPA (and other agencies) not only give an inaccurate picture of the negative impacts arising from those costs, but also overstate potential benefits. In this case, the dramatic new truck sales disruptions resulted in a delay of the environmental benefits projected for the "timely" introduction of cleaner engine-equipped trucks. As stated above this paper makes no attempt to quantify the actual benefit reductions associated with real-life compliance, however, the fact that they were significantly reduced is undeniable.

1. Long-Lead Time Rulemakings: A Mixed Blessing

EPA began to analyze the costs and benefits of its MY 2004-2010 truck emissions mandates in 1997. At the time, the agency touted the positive aspects of codifying future mandates well before they are to take effect by stating:

> In previous rules to set heavy-duty engine emission standards, EPA has typically allowed engine manufacturers about four years of preproduction lead time. This four-year lead time, the period called for in the Clean Air Act, has given manufacturers sufficient opportunity to complete the research, development, retooling, and certification efforts necessary to comply with promulgated emission standards. The requirements for the 2004 model year do not follow this pattern. The Statement of Principles and the Advance Notice of Proposed Rulemaking gave the engine manufacturers a good idea of the level of the emission standards and other related requirements a full eight years before 2004.[51]

Longer than necessary lead times are beneficial in principle, but can have significant unintended consequences where "technology forcing" standards are involved and compliance depends on hard-to-predict variables. All things being equal, the further away projections occur from an intended effective date, the less likely an agency will be able to accurately predict which technologies and strategies will be used, what they will cost, and whether and what degree they will be affordable and acceptable to potential customers.

2. NOx Reduction Technologies

The Regulatory Impact Analysis (RIA) for EPA's MY 2007-2010 rules was drafted in 2000, a full seven to ten years before actual implementation.[52] EPA recognized then that while enhanced EGR would serve as the primary NOx reduction compliance technology for the MY 2004 emissions standards, it would be insufficient to meet the more stringent MY 2007-2010 mandates. In 2000, EPA predicted specifically that, in conjunction with EGR, NOx adsorbers would be needed to achieve the 0.20 g/bhp-hr target. EPA did not predict and thus did not project the costs associated with SCR, the emission control strategy ultimately elected by most OEMs. EPA did not focus on SCR because, at the time, the agency lacked the assurances necessary to approve it as an enforceable approach. EPA was concerned specifically with urea

[51] EPA, *Final Regulatory Impact Analysis: Control of Emissions of Air Pollution from Highway Heavy-Duty Engines*, at 83 (September 1997).
[52] EPA, *RIA*, EPA 420-R-00-026 (December 2000).

infrastructure issues and user compliance mechanisms.[53] Despite an officially neutral stance, EPA indicated a bias for NOx adsorbers over SCR,[54] publically acknowledging its difficulty in recognizing that NOx adsorbers would have anything but wide application to address MY 2010 standards.[55]

EPA's support for NOx adsorbers arose out of a preference for hardware-only solutions versus approaches involving both hardware and operator input. This bias conflicted with significant OEM preferences for SCR, in part based on experience with using the technology in Europe.[56] In the end, most engine OEMs elected to adopt SCR technology to meet the MY 2010 0.20 g/bhp-hr target, consistent with policies issued by EPA.[57]

The NOx adsorber vs. SCR experience supports two points:

1. The further out in time compliance dates are set and the further ahead technologies and strategies are analyzed, the greater the likelihood projections will be wrong. Such uncertainties may be reduced by, among other things, providing for, analyzing, and projecting a range of potential compliance options.

2. Uncertainties inherent in cost/benefit analyses may be reduced by shortening the time frames in question and by providing for a range of costs and benefits for any given technology or strategy analyzed. Obviously, the SCR NOx reduction strategy, never rigorously analyzed in the EPA RIAs associated with these standards, ended costing significantly more to implement than what EPA projected NOx adsorbers would cost.

VI. CONCLUSION

All regulatory mandates have consequences, some intended and recognized, others either unintended or ignored. These consequences often involve real costs to the regulated entities and to, as in this case, related parties such as customers and employees. Forecasted public and private benefits can end up being dramatically overstated. Thus, it is incumbent upon EPA (and all regulatory agencies) to properly analyze, characterize, and project the costs and benefits of its proposals, especially where long lead times and production mandates are involved. Failing to do so only serves to undermine the efficacy of the regulatory process.

In this instance, EPA underestimated the up-front cost premiums associated with its truck mandates by a factor of 2-5 times. In addition, EPA also failed to accurately analyze and project

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[53] Johnson, *EPA Quietly Works Against Promising Engine Technology,* Transport Topics (January 6, 2003).
[54] Ibid.
[55] Malloy, *2010 Options Could Force Radical Leap,* Transport Topics (March 15, 2004).
[56] SCR is 'the only solution on earth today' that will meet the new regulations, said Pierre Lecoq, SVP, Global Product Development, Volvo Powertrain in Abramson, *Volvo Says SCR the Only Way to Meet 2010 Emission Rules,* Transport Topics (October 18, 2004); "DDC [Detroit Diesel Corporation] and Freightliner LLC, the nation's largest producer of Class 8 trucks, and others favor the use of urea because it can boost fuel economy in trucks and help achieve EPA's emissions targets for 2007" in Wislocki, *Urea supporters ready to seek EPA approval for SCR engines,* Transport Topics (September 8, 2003).
[57] See *e.g.,* 76 Fed. Reg. 312886, *et seq*. (June 7, 2011).

higher truck operating costs, reduced truck reliability, and lower truck fuel economy performance. Consequently, EPA's mandates resulted in significant and costly marketplace disruptions and reduced regulatory benefits. Notably, dealers are beginning to see instances of emissions tampering in their shops and on their used truck lots, suggesting how aggressive mandates also may not achieve desired benefits.

Unless mandated by statute, EPA should avoid promulgating mandates many years in advance covering long time periods as doing so necessarily involves uncertainty regarding key factors influencing the cost and performance of compliance strategies and technologies.

Appendix C: *Everything Electric at NADA/ATD Show 2022*

NADA Everything Electric at NADA/ATD Show 2022

› EV SOLUTIONS CENTER, BOOTH 6557N

Meet with electric vehicle experts one-on-one to learn how to get your operations EV-ready—and attend one of the many info-packed presentations.

Bradley Farr
OEM/Dealership Specialist, Ctr. for Sustainable Energy (CSE)
bradley.farr@energycenter.org

Zach Henkin
Dir., EV/EVI Prog. Research, CSE
zachary.henkin@energycenter.org

Loren McDonald
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Chris Neff
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Renee Stephens
VP, North America, We Predict
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Logan Sullivan
Gaudin Porsche of Las Vegas
lsullivan@gaudinporschelv.com

Matt Teske
CEO, Chargeway
matt@chargeway.net

Nigel Zeid
EV Educator, EV Transformotion
nigel@evtransformotion.com

› PRESENTATIONS AT THE EV SOLUTIONS CENTER, BOOTH 6557N

Friday, March 11

10:00am **Consumer Trends and Insights for Plug-in Vehicle Adoption**
Zach Henkin, CSE

Noon **True Cost of EV Service in the Field**
Renee Stephens, We Predict

2:00pm **EVs by the Numbers: Past, Present and Future**
Loren McDonald; EV Adoption

Saturday, March 12

10:00am **The EV Market and EV Consumers**
Chris Neff, PIA

Noon **The EV Customer Journey**
Chuck Ray, EV Energy

2:00pm **Dealership Electrification**
Dan Young, Future Energy

Sunday, March 13

10:00am **The EVolution of the Car Salesperson**
Nigel Zeid, EV Transformotion

› ELECTRIC AVENUE, SKYBRIDGE BETWEEN NORTH AND WEST LVCC

Stroll down for a look at the history and future of EVs and to learn about dealership EV success stories.

› EV EDUCATION NADA SHOW PRESENTATIONS

Thursday, March 10

12:15pm W325 SUPER SESSION **Plugging into What's Possible: Inside the EV Opportunity for Dealers**

WORKSHOPS

Thursday, March 10

1:00pm W230 **Win in the EV Market**
Stephanie Valdez Streaty, Cox Automotive

1:00pm W224 **Marketing to an EV-Focused Future**
Brittany Meyer and Connor Bonam, Dealer Inspire

4:00pm W218 **EV Charging Simplified: How to Compete with Tesla**
Matt Teske, Chargeway

Friday, March 11

10:30am W228 **Strategic Revenues with Solar and EV Charging**
Ryan Ferrero, SunPower

Saturday, March 12

9:00am W221 **Dealership of Tomorrow 2022: Is the Future Electric?**
Glenn Mercer

10:30am W218 **Introducing the Next Generation of EV Buyers**
Dania Rich-Spencer and Mike Dovorany, Escalent

10:30am W229 **EV Charging Simplified: How to Compete with Tesla**
Matt Teske, Chargeway

10:30am W230 **Strategic Revenues with Solar and EV Charging**
Ryan Ferrero, SunPower

Sunday, March 13

10:30am W221 **Introducing the Next Generation of EV Buyers**
Dania Rich-Spencer and Mike Dovorany, Escalent

THE EXCHANGE

Session: Preparing for the Future of Electric Vehicles
Brainstorm and problem-solve with NADA experts during peer-to-peer table discussions exclusively for and among dealers and managers.

Thursday, March 10, 4:00pm, N258

Friday, March 11, 4:30pm, N262

Sunday, March 13, 10:30am, N260

› ATD COMMERCIAL TRUCK EV EDUCATION

Thursday, March 10, 2:45pm

THE EXCHANGE **Preparing for the Future of Electric Vehicles**
Chopin 2, Encore Las Vegas

Friday, March 11, 8:00am

WORKSHOP **Embrace the Commercial Electric Vehicle Market**
Debussy 2, Encore Las Vegas

Friday, March 11, 10:30am

CONNECTION HUB **Electrification & America's Truck Fleet: A Conversation with Korey Neal**
Encore Ballroom 1-3, Encore Las Vegas